

suffering from dysentery, also in diarrhoea of children, in animals poisoned by arsenic, in impure water from various parts around Calcutta, indeed wherever he met with a fluid containing bacteria he examined it for comma-bacilli, without however finding any (except in one instance, see No. 8). He specially mentions that he has tested saliva and the material on the teeth and tongue, which is always full of bacteria, but always with a negative result. He further refers to his own previous large experience in the cultivation of bacteria, and that of others who have worked at cultivation, this experience being against the presence of this organism, except in cholera. From these facts he feels himself warranted in stating that "the comma-bacilli constantly accompany cholera, and are never found elsewhere."

(7) No other conclusion can be arrived at than that these bacilli are the cause of cholera.

(a) It might be said that the choleraic process merely favours the growth of this bacillus. But on this supposition every one must have comma-bacilli in his body, because they are present in cases of cholera occurring in widely-separated parts of the world. This, however, is not the case (No. 6).

(b) As the result of the disease, conditions arise which cause the transformation of some ordinary bacterium into comma-bacilli. There is no evidence of such rapid transformation of one form of bacterium into another. The only known case of alteration in the properties of these bodies is the attenuation of anthrax bacilli, &c., but this is merely an alteration in pathogenic action; their form and mode of growth remain unaltered. Outside the body Koch has not, during the course of his investigations, got the slightest evidence of any change in these bacilli.

(c) The only conclusion which remains is that the cholera process and these bacilli stand in close relation to each other—in a relation of cause and effect.

(8) Although by experiments on animals direct evidence that the comma-bacillus is the cause of cholera has not been obtained, there are various observations which are almost as good as experiments on man.

In one case in a village near Calcutta Koch examined the water of a tank which supplied the inhabitants with drinking-water, &c. A number of cases of cholera had occurred, and when the water was examined the epidemic was at its height. Comma-bacilli were found in the water in considerable numbers. At a later period, when there were only few cases of illness, the comma-bacilli were few in number, and only found at one part of the tank. This was the only instance in which Koch found these bacilli outside the body. He further refers to the occurrence of disease in washerwomen, and infection from clothing soiled with cholera dejecta.

(9) The natural history of the disease corresponds with the various characteristics of this organism.

The bacilli grow rapidly, soon reach their highest point of development, and then die: this corresponds to what occurs in the intestinal canal. Under ordinary circumstances these bacilli are destroyed in the healthy stomach. This corresponds to the clinical facts of cholera, for, of a given number of individuals exposed to cholera, only some are taken ill, and those almost all suffer from disturbance of digestion—either catarrh of the stomach

or intestine, or overloading of the stomach, &c., with indigestible food. The disease dies out in places where the conditions for its continuance are unfavourable: the bacilli have no spores.

These are the facts on which Koch's views are based; lately, however, two researches have been published which strike at the root of the theory, and which try to show that these bacilli are not peculiar to cholera. Dr. Koch has also published a reply.

The first of these researches is that of Dr. Lewis, who finds bacilli in the mouth microscopically identical with the comma-bacilli. Koch's reply (*Deutsche Med. Wochenschrift*, No. 45, 1884) is that he is well aware of the fact that organisms somewhat resembling the cholera bacillus are present in saliva, but that he does not diagnose these bacilli by microscopical characters alone, that if these bacilli are cultivated they will be found to be quite different from those present in cholera. For instance, they will not grow at all in the neutralised cultivating gelatine in which the cholera bacilli grow rapidly. The other research is by Finkler and Prior, who stated that they had found the comma-bacillus in cases of cholera nostras, and who further described spore-formation in them. Koch succeeded in obtaining a specimen of their "pure" cultivations, and found, on shaking up a minute quantity with the liquefied gelatine and pouring it out on a glass plate, that they had a mixture of four different bacilli, and that none of them were the comma-bacilli described by him.

Koch further adds the interesting fact that he has again taken up the experiments on the lower animals (presumably, from the context, on dogs and guinea-pigs), and that by injecting minimal quantities (as little as the rooth of a drop) of the cultivations of comma-bacilli into the small intestine, the animals have as a rule died in one and a half to three days, and the post-mortem appearances of the intestine were the same as in acute cases of cholera, the fluid in the intestine also containing enormous numbers of comma-bacilli.

In two cases of cholera nostras, and in a diseased bee, the writer found bacilli which microscopically closely resembled the comma-bacilli, but it was found that they did not grow in the neutralised gelatinised material, and were therefore not the same organism.

THE HAYTIAN NEGROES

Hayti; or, The Black Republic. By Sir Spenser St. John, K.C.M.G. (London: Smith, Elder, and Co., 1884.)

WHATEVER theory may be adopted regarding the fundamental equality or disparity of the human races, a truthful and unbiased account of the present social condition of the Haytians, by a competent observer, must necessarily prove a valuable contribution to the study of psychological anthropology. These conditions are eminently satisfied in the work before us, written as it is by a man personally above suspicion of any unworthy motive, by a statesman who has associated for some five-and-thirty years with every variety of coloured peoples, by a distinguished diplomatist, who, as British Minister and Consul-General, has resided for twelve years in Hayti itself. On the other hand, no more favourable field could be selected for a study of the negro race than this western and smaller division of this large West Indian island,

second in size only to Cuba, of which it forms a natural continuation eastwards to Porto Rico. Here the eastern and much larger division, known as Santo Domingo, has been mainly in the hands of a "coloured," that is, negroid or mulatto people, since the expulsion of the Spaniards and French early in the present century. But in Hayti the pure negro has always been in the ascendant, and his policy has persistently been to get rid of the white and coloured elements. The whites disappeared, either exterminated or driven into exile, during the struggle with France; and of the present population, roughly estimated at some 800,000 or 900,000, not more than one-tenth are mulattoes, and all the rest full-blood Africans. The Haytians may, in fact, be regarded as a section of the negro race transplanted bodily to their present domain, where they have had it all their own way since the close of the last century. Whatever differences may exist, are all in their favour; for they here find themselves separated from the old baneful associations, and surrounded on all sides by the civilising influences of more cultured peoples. The physical environment is also more favourable, the climate being on the whole decidedly superior to that of the African sea-board, while the well-watered lowlands are described as amongst the most fertile tracts on the globe.

And what is the outcome of fully three generations of political autonomy under these exceptionally advantageous conditions? Practically a reversion to, or, more correctly speaking, an almost uninterrupted perpetuation of, the African tribal organisation in its very worst aspects. Such is the general conclusion conveyed by a careful study of Sir S. St. John's work, which may be briefly described as a formidable indictment against the negro race as such, and a crushing reply to those sentimental philanthropists who go about preaching the doctrine of the inherent equality of all mankind. In a few well-digested chapters he deals comprehensively with the history, government, trade, industries, and social institutions of the "Black Republic," and on all these branches of the question his verdict is in the highest degree adverse. "I could not but regret," he writes, "that the greater my experience the less I thought of the capacity of the negro to hold an independent position. As long as he is influenced by contact with the white man, as in the southern portion of the United States, he gets on very well. But place him free from all such influence, as in Hayti, and he shows no sign of improvement. On the contrary, he is retrograding to the African tribal customs, and without exterior pressure will fall into the state of the inhabitants of the Congo. I now agree with those who deny that the negro could ever originate a civilisation, and that with the best of education he remains an inferior type of man. He has as yet shown himself totally unfitted for self-government, and incapable as a people of making any progress whatever. To judge the negroes fairly, one must give a considerable time in their midst, and not be led away by the theory that all races are capable of equal advance in civilisation" (pp. 131-132).

This general conclusion is amply supported by overwhelming evidence collected at first hand by a shrewd observer, whose official position enabled him to obtain accurate information regarding every phase of Haytian political and social institutions. That the successive "empires" and "republics" were mere burlesques;

that the administration of justice has always been a farce; that civic virtues are absolutely unknown; that, in a word, "politically speaking, the Haytians are a hopeless people" (p. 133), will probably be accepted without demur by the intelligent reader. But that fetish worship, cannibalism in its most repulsive forms, and all the abominations associated with the secret "Vaudoux" rites, are still rampant, and encouraged if not actually practised by the very highest State functionaries, including Presidents themselves, would certainly be received with a smile of incredulity, were the facts not attested by evidence of the most unimpeachable character. Even so the revelations made in connection with this loathsome subject almost exceed the bounds of belief, and could not be accepted, were we not assured that they are "founded on evidence collected in Hayti, from Haytian official documents, from trustworthy officers of the Haytian Government, my former colleagues, and from respectable residents—principally, however, from Haytian sources" (Introduction).

To the question, Who is tainted by the Vaudoux¹ worship? the answer is, "Who is not?" Yet a prominent feature of this horrible cult is the sacrifice of "the goat without horns," that is, of some human victim, often supplied by the parents themselves, who also share in the feast at which their murdered offspring is devoured. At a trial held in 1864, four women were convicted on their own confession of having killed and eaten a girl, six years old, delivered to them by the aunt, and of feeding up another child to be sacrificed and eaten on the Feast of the "King of Africa." A Spanish official present at the trial reported that, if the public prosecutor had done his duty, "not only the witnesses but the mother of the victim herself would have shared the fate of the cannibals proved guilty of having eaten her." Another woman, reproached with having devoured her own offspring, retorted, "And who had a better right? Est-ce que ce n'est pas moi qui les ai fait?" And in 1878 a case came under the notice of the author, in which two women were caught in the act of eating the flesh of a child raw. "On further examination it was found that all the blood had been sucked from the body" (p. 225).

In common with many other observers, the author noticed "that negro boys up to the age of puberty were often as sharp as their coloured fellow-pupils," adding that "there can be no doubt that the coloured boys of Hayti have proved, at least in the case of one of their number, that they could hold their ground with the best of the whites" (p. 266). But it is equally certain that after reaching puberty further progress appears to be arrested, so that the negro remains intellectually a child to the last. This remarkable phenomenon is probably due to the premature closing of the cranial sutures in the negro race, as suggested by Filippo Manetta, who also noted the sudden arrest of development in adults. "The intellect seemed to become clouded, animation giving place to a sort of lethargy, briskness yielding to indolence. Hence we must needs suppose that the evolution of the negro and white proceeds on different lines. While with the latter the volume of the brain grows with the expan-

¹ Apparently a corruption of the West African word *Vodun*, implying a species of ophiolatry, in which the great serpent, an all-powerful supernatural being, on whom all things depend, is worshipped by secret rites, nocturnal orgies, and human and animal sacrifices.

sion of the brain-pan, in the former the growth of the brain is on the contrary arrested by the premature closing of the cranial sutures and lateral pressure of the frontal bone." ¹

The chapter on the curious French Creole patois current amongst the Haytiens will be found instructive by students of such jargons. Its euphonic laws and peculiar structure, or rather absence of structure, are illustrated by a number of passages from popular songs and proverbs, such as the characteristic—

"Nègue riche li mulatte,
Mulatte pauvre li nègue."

That is—

"Negro enriches mulatto,
Mulatto impoverishes negro."

Beyond oral compositions of this sort there is no local literature, and the public records, diplomatic communications, and correspondence of all sorts are written in more or less grammatical French. None of the full-blood blacks have aspired to the honours of authorship, or attempted any sort of literary composition beyond an occasional political essay or manifesto. In this as in all other respects there seems to be an impassable gulf even between them and the coloured portion of the population.

The book is furnished with a useful map of Hayti; but there are neither illustrations nor index.

A. H. KEANE

OUR BOOK SHELF

Hilfsbuch für den Schiffbau. Von Hans Johow. (Berlin: Julius Springer, 1884.)

THIS handsome volume belongs to the class of publications known as "pocket-books," of which there are many examples, in English, adapted to the use of various branches of engineering. It is essentially a compilation of facts, formulæ, and methods likely to prove useful to ship-builders in the course of their ordinary work; and it will bear favourable comparison with anything of the kind previously published. In the range of its information, and the extent as well as variety of the sources drawn upon, Mr. Johow's book surpasses all others intended for the use of ship-builders; evidencing wide research and a thorough acquaintance with the literature of the profession. It cannot fail to prove valuable as a book of reference in the offices of all ship-yards, and should be of great assistance to draughtsmen, especially in carrying on calculations or details of design.

The arrangement of the book is excellent, and it is admirably produced, the numerous tables and diagrams, as well as the mathematical investigations, being clearly printed and easily followed in reading. This has been accomplished without making the volume large or expensive. Five principal sections embrace the contents.

The first section contains a mass of general information and tables, designed to facilitate reference and save labour. In the mathematical subdivision of this section appear tables of the squares, cubes, square root, cube root, &c., of numbers up to 1000; trigonometrical tables; algebraical and trigonometrical formulæ of various kinds. Another subdivision deals with "mass and weight," giving full particulars of the weights and measures of various countries, and tables for conversion of one system to the others. Tables of weights of materials follow, and are very extensive and well arranged; in addition, there is a brief summary of the principles of strength of materials, in-

cluding Wöhler's valuable investigations on the "fatigue" of metals. Brief chapters are also devoted to the theory of heat, chemistry, and galvanism; and finally a good deal of information is given on details of design, fastenings, &c.

The second section deals with the theory of ship-building. It gives particulars of various systems of mechanical construction for the forms of ships; deals with the problems of buoyancy and stability, and describes methods of calculation; gives approximate formulæ for use in preliminary investigations; and deals in a practical fashion with ocean waves, propulsion of ships by sails, the action of the rudder, fluid resistance, and propulsion by steam power. Under the last heading appears a most comprehensive summary of the various methods proposed for approximating to the engine-power required to give steamships their assigned speeds. Lastly there is a chapter on compass-correction.

The third section deals with more practical questions relating to the lading and freeboard of ships; their outfit of anchors, chains, boats, pumps, &c.; the armaments of war-ships; the methods of testing materials used in ship-building, &c.

In the fourth section are contained detailed information relating to the propelling machinery, boilers, and propellers of ships; the rules of the Board of Trade for boilers; and tables, &c., for use in trials of speed.

The fifth and last section contains details of the laws and regulations affecting German and foreign shipping, various rules for calculating tonnage, and our Board of Trade regulations for passenger-steamers. An excellent index concludes the book.

It cannot be supposed that such a great mass of information has been brought together and greatly condensed without some sacrifices and possible errors; but the author has evidently taken pains to insure accuracy, and his book should command a wide circulation both in Germany and abroad.

W. H. W.

A Synopsis of Elementary Results in Pure and Applied Mathematics: containing Propositions, Formulæ, and Methods of Analysis, with Abridged Demonstrations. By G. S. Carr, M.A. Vol. i., Sections x., xi., xii. (London: Francis Hodgson, 1884.)

OUR notices of the former sections will be found in vol. xxii. (p. 582) and vol. xxvi. (p. 197). These sections are occupied with the Calculus of Variations (pp. 441 to 459), Differential Equations (pp. 460 to 545), and the Calculus of Finite Differences (pp. 546 to 560). In the first section we have not detected any mistakes of any importance, in fact only one or two typographical faults. The second section commences with an unfortunate slip in the numbering of the articles, which is not pointed out until the next sheet is commenced (p. 473). In this section there are numerous errata, of which we indicate a few. In § 3276 the first term in the last line should have the mark of differentiation with regard to x affixed. We note mistakes in §§ 3342, 3382, 3392, 3394, 3399, 3407, 3431, 3447, 3499, 3520, 3521, 3537, 3570. These corrections are mostly for wrong references, and the articles are cited for the benefit of students. The last section appears to be quite right, with the exception of a typographical error in § 3703. We have not undertaken to work out and verify each article, but we have gone through each, and the above small list of mistakes will give an idea of the care exercised in the editing of this part. We repeat our former advice, viz. that a student who wishes to refer to the "Synopsis" for refreshing his knowledge of the above-named branches should at the time of his reading his text-book have this manual by him for verification. The sections are mainly based upon Jellett (for Variations), and Boole (for the two latter sections).

¹ "La Razza Negra nel suo stato selvaggio, &c." p. 20. (Turin, 1864.)